

**Comments and Responses to Comments Received on September 28, 2010 Discussion Draft of
Best Management Practices for Site-specific Non-water Corrective Action Plans
CalRecycle
December 2010**

Section	Comment #	Comment	Response
General	SWIG1-1 SWIG2-1 SWIG 2-2 SDcity2-1 SDcity 2-3 Stanco-1	The proposed BMPs in CalRecycle's draft guidance document use causal events that we believe are not "reasonably foreseeable" and are, therefore, unacceptable as proposed.	<p>The proposed BMPs for earthquakes, tsunamis and flooding are comparable to SWIG's proposal. For the fire causal event, staff considered the fire at Olinda Alpha Landfill in Orange County (as referenced in the SWIG letter) as well as recent surface fires at other California landfills in development of the proposed BMP, staff reviewed the information received from OC Waste and Recycling and has modified the BMP for fire as a causal event. Staff disagrees with SWIG's proposed BMPs for the precipitation causal event.</p> <p>SWIG is proposing that seiches are not considered a reasonably foreseeable causal event without any criteria or support information. Seiches are identified specifically in the regulations as a causal event. As indicated in the Sept 28th draft document, on Page 20, 'In a 2003 report prepared by GeoSyntec Consultants, Inc, it was reported that eight landfills were located near a bay or estuary.' For these eight landfills, it would be appropriate to evaluate if a seiche would have adverse impacts on the landfill.</p>
General	SWIG1-2	Given that each landfill is different, the specific setting, geological profile, and other local characteristics need to be taken into account or considered in the corrective action plans.	Comment is consistent with staff statement on Page 7 of September draft document, "The location, design, operation and maintenance of a landfill are critical factors in determining if there will be any impacts due to a causal event and to what extent. " and on Page 8, "CalRecycle staff in defining the seismic causal event considered the types of corrective action activities that may need to be undertaken at an active or closed solid waste landfill as a result of an earthquake and the specific characteristics of a landfill, including its design, location and level of compliance."

Note: The referenced staff document, September 28, 2010 Discussion Draft of Best Management Practices for Site-specific Non-water Corrective Action Plans is available at: <http://www.calrecycle.ca.gov/LEA/Regs/Implement/Postclosure/DraftBMPs.pdf>. The revised draft staff document dated December 2010 contains the current proposed BMPs based upon the latest round of stakeholder comments. **Page 1 of 9**

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General	SC		Comments were addressed in Background Document or FAQs
General	SWIG1-3	The premise that seismic events that exceed those well-established design standards are somehow 'Reasonably foreseeable' is troubling to the solid waste industry in California.	Comment appears to be inconsistent with the other recommendation provided by the Solid Waste Industry Group to use the MCE.
General	SWIG2-6 Stanco-4	SWIG proposes two tiers of evaluation for each causal event, landfill design requiring no corrective action cost estimate and reasonably foreseeable causal event exceeding Class III landfill design standard.	The proposed BMPs already have this framework. Staff used the term 'not reasonably foreseeable' to be consistent with the regulatory language regarding the reasonably foreseeable causal event. A landfill that meets the criteria in the proposed BMP for a not reasonably foreseeable event is not being required to conduct the evaluation for a causal event.
Precipitation	SWIG2-3 Stanco-2	Extreme uncertainty in quantification or estimate is questionable-The event is so improbable and such an outlier that there is very poor accuracy or tremendous uncertainty in quantifying the impact. An example is the 1000-year 24-hour storm, where in October 2007 the National Oceanic and Atmospheric Administration (NOAA) considered discontinuing the publication of the 1000-year precipitation frequency estimates because of the 'severe uncertainty associated with computing such extreme events.'	Staff was unable to find any information on the NOAA website that the 1000-year 24-hour storm will no longer be used. As with any predictive model, there is always a level of uncertainty in the accuracy or precision of the results, this is true for actuary charts, estimates for the 100-year storm, and the flood zone maps. Staff has documented the fact that 1000-year 24-hour storm events have occurred in California (Department of Water Resources, Bulletin 69-95, California High Water, October 2003), thus the event is foreseeable.

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Precipitation	SWIG2-7 Stanco-5	CalRecycle staff proposes a 1000-year 24-hour storm as the BMP primarily because the Central Valley Regional Water Quality Control Board included the rainfall estimate of such a storm in the WDRs for a couple of Class II disposal facilities.	The basis for selecting the 1000-year 24-hour storm as the BMP, as stated in the draft document, is that 1000-year 24-hour storm event is a design standard for a Class II landfill. As stated in the draft document, the conditions in Waste Discharge Requirements were provided as examples of the difference between the 100-year and 1000-year storm events.
Precipitation	SWIG2-8	A 1000-year 24-hour storm is an extreme event where there is tremendous uncertainty in the estimating the amount of rainfall. A 1000-year 24-hour storm is not a reasonable foreseeable causal event.	The 1000-year 24-hour storm events have occurred in California as documented in the 2003 Department of Water Resources report and therefore should be considered reasonably foreseeable causal events.
Precipitation	SWIG2-9	In California, the average annual precipitation varies greatly across the state. Some regions have very arid climates while others are prone to wet weather.	The historical rainfall data for a location will be used in predicting the amount of rain for the 1000-year storm event, thus a lower amount of rain will be estimated for an arid region when compared to a wetter region.
Flood	SWIG2-4	In other words, there is a 99.9% chance of it not occurring. Such a storm is considered an extreme event, not a reasonably foreseeable event. As another example, the Federal Emergency Management Agency defines an "extreme flood as a 0.2% chance of exceedance (500-year flood)"	It is correct that the 1000-year 24-hour storm has a 0.1% chance of occurring in any year. The 1000-year 24-hour storm events have occurred in California. SWIG's reference to FEMA is not consistent with FEMA's definition of the hazard zones. FEMA has defined that Zone B, the floodplain areas between the limits of the 100 and 500-year floods to be areas of moderate flood hazard and Zone C is considered minimal flood hazard as areas above the 500-year flood level. (The reference is FEMA's website on Frequently Asked Questions)

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Section	Comment #	Comment	Response
Flood	SWIG2-10 Stanco-6	Proposed that 100-year flood for landfills in areas designated by FEMA as low risk, so a de minimus amount of damage is assumed.	FEMA in defining each of the zones on a flood map, defines within the 100-year flood plain as high risk, between the 100-year to 500-year flood zones as moderate and minimal risk for areas outside of the 500-year flood zone. The comment is not consistent with FEMA designation of flood zones.
Flood	SWIG2-11 Stanco-6	200 to 500-year flood for landfills in areas designated by FEMA as moderate risk, depending on site-specific hazard analysis	FEMA in defining each of the zones on a flood map by definition defines within the 100-year flood plain as high risk, between the 100-year to 500-year flood zones as moderate and minimal risk for areas outside of the 500-year flood zone. The comment is not consistent with FEMA designation of flood zones. No basis was provided for the range.
Flood	SWIG2-12 Stanco-6	500-year flood for landfills in areas designated by FEMA as high risk.	The comment is not consistent with FEMA designation of flood zones, FEMA defines within the 100-year flood plain as high risk.
Flood	SWIG2-13 Stanco-6	200-year flood for landfills in areas undesignated by FEMA.	No basis was provided. FEMA has defined Zone D to be areas of undetermined but possible flood hazards. These areas are probably outside of the 500-flood zone.
Flood	SWIG-14	In an October 7, 2008 presentation to the National Committee on Levee Safety, Dr Gerry Galloway of the Water Policy Collaborative recommended that a 200-year flood be the standard of flood protection by 2030 in order to provide the “highest level of risk reduction feasible to existing urban areas.”	Dr. Galloway’s presentation also contained recommendations that the 500-year flood event or levels be used to recognize levees under the NFIP.

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Fire	SWIG2-5 SWIG2-15 Stanco-3	Ignores Fact or Real Cases of Epic Catastrophic Events (in California)...For example, the fire that impacted Olinda Alpha Landfill in Orange County primarily damaged the landfill gas collection header pipes around the perimeter of the landfill.	The Olinda Alpha Landfill and other landfill fires were considered by staff in development of the proposed BMP, as documented on Page 25 of the September 28 th draft document. "It is recommended that an assumption that 80% of the combustible surface structures within 300 feet of the landfill cell boundaries are destroyed if the landfill is located in a very high fire hazard zone, the percentage of structures potentially destroyed should be reduced if there are engineered systems to mitigate surface fires such as berms or fire breaks, or if there is no vegetation to sustain a fire." Staff reviewed the information received from OC Waste and Recycling and has modified the BMP for fire as a causal event. See page 14 in the November 2010 document on the BMPs.
Fire	SWIG2-16	The California Department of Forestry and Fires (Cal Fire) and local agencies have developed hazard maps that show low, moderate, high or very high fire risk zones.	The draft document and proposed BMPs already recognized the maps and information that is available from Cal Fire and local fire agencies.

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Fire	SWIG2-17 Stanco-7	CalRecycle's proposed BMP assumes that up to 80 percent of the combustible surface structures within 300 feet of the landfill cell boundaries would be destroyed.	<p>The information received from OC Waste & Recycling regarding the fire at the Olinda Alpha Landfill clearly states that "All material which was above ground that was exposed to the fire has been compromised and/or destroyed." Staff reviewed the information received again to refine the BMP to reflect the damage caused at the Olinda Alpha Landfill and follow-up with OC Waste & Recycling to determine what percentage of their entire system was destroyed in the fire and what was the distance into the landfill that the fire affected. Staff has revised the BMP to reflect the Olinda Alpha landfill fire.</p> <p>The proposed BMP provides for additional consideration of site conditions to decrease or increase the assumption of the structures that may be destroyed, the percentage of structures potentially destroyed can be reduced if there are engineered systems to mitigate surface fires such as berms or fire breaks, or if there is no vegetation to sustain a fire." Likewise, the percentage of structures that could be destroyed should be increased if significant burnable material (e.g. weeds) is located on the landfill.</p>
Fire	SWIG2-18 Stanco-8	CalRecycle staff proposes a 20 percent contingency to replace surface structures even if the landfill is not located in any fire hazard zone. This is certainly not reasonably foreseeable.	<p>As mentioned in the draft document, surface fires have been caused by landfills accepting wastes that are still smoldering, accidents or arson.</p> <p>The BMP has been revised to propose a 5% contingency to be used for a landfill not located in any fire hazard zone.</p>

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Seiche	SWIG2-19 Stanco-9	Given that the only known occurrence of seiche in California was during prehistoric times around Lake Tahoe, seiches are not reasonably foreseeable.	A seiche is specifically identified in the regulations (27 CCR §22100(c) (2) as a causal event. As indicated in the draft document, on Page 20,' In a 2003 report prepared by GeoSyntec Consultants, Inc, it was reported that 8 landfills were located near a bay or estuary.' It is appropriate for these 8 landfills to evaluate if a seiche would have adverse impacts on the landfill.
Tsunamis	SWIG2-20 Stanco-10	Tsunamis should only be a reasonably causal event if the landfill is located in tsunami inundation zone as inundated by the California Department of Conservation or local emergency agency and the topography between the landfill and coastline is not higher than the predicted wave height.	The comment is identical to the proposed BMP for tsunamis.
Earthquake	SWIG1-4 SDcity1-1	If the landfill feature is designed to the MCE then no corrective action cost estimation or analysis is required.	This is what staff had proposed, that seismic is not a foreseeable event if the landfill is designed to the MCE.
Earthquake	SWIG1-5	For landfills not designed to the MCE, operators would evaluate the potential damage caused by a seismic event with a return period ranging from 200 to 475 years using the probabilistic method. The third party involved would determine the specific return period after evaluating all site-specific factors; some may include risk factors identified in the AB 2296 study.	The proposed BMP provide three ranges of return period to be used that is comparable to the comment. Staff has modified the proposed BMP to remove the ranges for the landfills that comply with the minimum standard. The BMP requires using the 200 year return period for the lowest risk landfills and the 475 year return period for medium risk landfills; and retains the range of 475 to 950 year return period for landfill with the greatest risk.

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Earthquake	SWIG1-6	Class III landfills, which are not built for human occupancy are considered a relatively low hazard since there would generally be no potential for loss of life, no likely disruption of essential service, and typically minimal to no property losses.	Staff agrees that Class III landfills are not design for human occupancy. The comment referred to the criteria that are used by the Army Corps of Engineers for evaluating potential loss of life. The proposed BMPs are consistent with the SWIG proposal.
Earthquake	SWIG2-21	Certain factors, such as immediate proximity to a fault and soils subject to liquefaction, increase the seismic hazard or risk for the landfill.	This is already addressed in the proposed BMPs for an earthquake on page 11 of the draft document.
Earthquake	SWIG2-22	It was the opinion of many stakeholders at the time that the AB 2296 risk factors were essentially worthless as a risk measurement tool. The risk factors were overly simplistic, unrelated to landfill integrity, not based on any engineering or science, and had no direct connection to a release or probability of CA.	Staff proposed using the method in the AB 2296 study to develop a tiered approach to identify a range of return periods to be used as part of a probabilistic analysis. A review of the factors used in the method indicates that factors such as engineering design for compliance with Subtitle D and rainfall are directly related to landfill integrity; and factors such as proximity to urban areas and depth to groundwater are also good indicators of potential risk (these factors are considered in the Hazard Ranking System for Superfund sites). SWIG is correct that the method is not a risk assessment tool, but staff finds that the method is a useful tool for determining the relative risk that may be posed by a landfill.
Earthquake	JC	There has to be some flexibility in the scoring (for the Landfill Risk Category methodology). Example if a landfill was located within 500 feet of the 100-year flood plain, the site was surrounded entirely by a 6-7 feet earthen berm. That may justify moving it into the low risk category.	Staff agrees that there should be flexibility, the example provided may support that the low risk category for the floodplain be applied. The BMPs are not rules, and are technical guidance to assist owners and operators in preparing the Corrective Plans.

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List of Commenters

Commenter		Date of Comments
City of San Diego	SDcity1	October 1, 2010
Solid Waste Industry Group	SWIG1	October 4, 2010
John Cupps	JC	Email October 12, 2010
Stanislaus County Dept of Environmental Services	StanCo	October 13, 2010
Solid Waste Industry Group	SWIG2	October 15 and 18, 2010
City of San Diego	SDcity2	October 12, 2010
Sierra Club*	SC	October 6, 2010

*Commented on the August 2010 draft of the BMP guidance document

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THE CITY OF SAN DIEGO

October 1, 2010

Mr. Watson Gin, Project Manager
CalRecycle
1001 I Street
Sacramento, CA 95812

Dear Mr. Gin:

SUBJECT: Proposed Guidance Document language related to Site-Specific Non-Water Quality Corrective Action Plans

The City of San Diego appreciates the opportunity to participate in the development of the guidance document that will be used by landfill operators in California to prepare non-water quality corrective action plans. The non-water corrective action plan requires landfill operators to provide funding for a "reasonably foreseeable" catastrophic event that is assumed to impact the landfill. We believe the proposed Best Management Practice (BMP) for seismic hazards in the guidance document for evaluating non-water releases as a result of a seismic event is inappropriate. We ask that the guidance document allow for past experience as the guidance of what can be projected as a "reasonable foreseeable" catastrophic event.

As a replacement to the currently proposed draft guidance document, we agree with the recommendation provided by the Solid Waste Industry Group. This alternative provides two approaches: 1) If a maximum credible earthquake (MCE) has been designed for, then no corrective action cost estimation or analysis shall be required. 2) For landfills not designed to the MCE, the operators' consultant (third party) would determine the specific return period after evaluating all site specific factors such as past history, experiences and data, in order to evaluate the damage caused by a seismic event. This will be generated using a probabilistic method that includes the information about all historic earthquakes, geologically inferred earthquakes, and must compute the peak ground acceleration that a site may experience during a specified return period for the "reasonable foreseeable" catastrophic event.

Thank you for your consideration of these two alternative approaches. Please contact Sylvia Castillo, Senior Civil Engineer, at 858-492-5032 if you have any questions.

Sincerely,

Chris Gonaver
Environmental Services Director

LW/WC

Office of the Director • Environmental Services Department

9601 Ridgehaven Court, Suite 210 • San Diego, CA 92123-1636
Tel (858) 573-1200 Fax (858) 492-5021



MS/W. Gin



THE CITY OF SAN DIEGO

October 12, 2010

Mr. Watson Gin, Project Manager
CalRecycle
1001 I Street
Sacramento, CA 95812

Dear Mr. Gin:

Subject: CalRecycle's Proposed Best Management Practices (BMPs) for Preparing Site-Specific Non-Water Quality Corrective Action Plans

The City of San Diego appreciates the opportunity to participate in the development of the guidance document that will be used by landfill operators in California to prepare non-water quality corrective action (CA) plans. The non-water CA plan requires landfill operators to provide funding for a "reasonably foreseeable" catastrophic event that is assumed to impact the landfill. CalRecycle has proposed catastrophes (causal events) so extreme and so improbable that they are not, by any measure, "reasonably foreseeable." We ask that the guidance document allow for past experience as the guidance of what can be projected as a "reasonable foreseeable" catastrophic event.

As a replacement to the currently proposed draft guidance document, we agree with the recommendation provided by the Solid Waste Industry Group (SWIG). This alternative provides two approaches: 1) Should a landfill be designed to a standard above or sufficient to withstand a reasonably foreseeable causal event, then no non-water quality CA cost estimate will be required for that event. 2) Should the landfill feature not be designed as stated in the previous approach, then a non-water quality CA would be estimated based on a reasonably foreseeable causal event impacting the landfill that exceeds the existing Title 27 minimum design standard for Class III landfills. SWIG proposes a range of what is reasonably foreseeable for that causal event, which allows for the third party expert or consultant to determine what specific causal event is appropriate for the landfill given site-specific characteristics and hazards. We agree with all the specific causal events or BMPs that SWIG proposes for precipitation, flood, fire, seiche, and tsunami.

Thank you for your consideration of these two alternative approaches. Please contact Sylvia Castillo, Senior Civil Engineer, at 858-492-5032 if you have any questions.

Sincerely,

Chris Gonaver
Environmental Services Director

WC

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MS/W. Gin



DEPARTMENT OF ENVIRONMENTAL RESOURCES
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October 13, 2010

Watson Gin
Department of Resources Recycling and Recovery
801 K Street, MS-1901
Sacramento, CA 95814

VIA EMAIL, followed by USPS

**RE: COMMENTS ON PROPOSED BEST MANAGEMENT PRACTICES FOR
PREPARING SITE-SPECIFIC NON-WATER QUALITY CORRECTIVE
ACTION PLANS**

Dear Mr. Gin:

Thank you for the opportunity to comment on the *Proposed Best Management Practices (BMPs) for Preparing Site-specific Non-water Quality Corrective Action (CA) Plans*. As the operator of two landfills that would be subject to these CA Plans, the Geer Road and Fink Road Landfills, Stanislaus County would like to offer comments to assist in the development of the final BMPs.

Historically, landfills have been required to provide financial assurances to cover the estimated costs associated with water releases. New regulations adopted in December 2009 require the owners/operators of disposal facilities to also provide financial assurance for potential non-water releases if they exceed the cost estimates for water releases. When this is the case, one option is to allow the cost estimates to be based on a site-specific Corrective Action (CA) Plan in lieu of using the dollar figure that represents the cost to replace the landfill's entire final cover.

If the CA plan option is chosen, cost estimates are to be based on reasonably foreseeable catastrophic events that may occur in the future. The extent of repairs (corrective action) that the landfill operator is to assume depends on severity of the hypothetical catastrophe. While the Draft BMP document indicates that it is being "...offered as 'good ideas' that may need to be adjusted..." once documents of this nature are adopted they tend to become the standard. Given this, it is recommended that the BMP document include language that clearly states that its contents are non-binding guidelines.

The financial assurance regulations that were adopted in 2009 mandate that CA Plans be based on what is "reasonably foreseeable" and site-specific. CalRecycle's Draft BMPs, however, include catastrophes (causal events) that seem extreme and, therefore, improbable such that they would not be "reasonably foreseeable." Because of this, these causal events are in need of revision and reconsideration. Instead, CalRecycle should consider alternative BMPs for each causal event as suggested herein. It should not be assumed that what is theoretically possible – no matter how improbable or remote – is reasonably foreseeable.

MS/W.Gin

Reasonably Foreseeable

Reasonably foreseeable is what is likely or can be predicted to occur in the not too distant future with some degree of certainty based on empirical, historical, or scientific evidence. It is not an event of such low probability that the chances of it occurring at any given moment are extremely remote, which would be speculative in nature. Any of the following criteria can be used to disqualify a causal event from being considered reasonably foreseeable:

- *Extreme Uncertainty in Quantification or Estimates that are Questionable* – The event is so improbable and such an outlier that there is very poor accuracy or tremendous uncertainty in quantifying the impact.
- *Extremely Low Probability of Occurrence* – The severity of certain types of causal events (earthquakes, precipitation, and floods) are determined by the probability of such an event occurring in any given year. As probability approaches zero, however, the causal event becomes so improbable and so infrequent that it can no longer be considered reasonably foreseeable. It is instead considered an “extreme event” that is unlikely to occur and too speculative to predict. For example, if there is a 0.1 % chance of a 1,000-year 24-hour storm occurring in any given year, then there is a 99.9% chance of it not occurring.
- *Ignores Fact or Real Cases of Epic Catastrophic Events (in California)* – Regarding facts and real case examples, there have been real cases in which severe fires have impacted landfills. While these fires have destroyed homes and structures, the damage to landfills was minimal. Landfills often act as a firebreak given the significant amount of dirt-covered surface area they contain. Even Stanislaus County’s Geer Road Landfill experienced a grass fire in 2006 that was started by vandals. The damage was not only limited to gas collection piping, very few structures exist at this site and none were damaged. To assume greater losses as proposed in the guidance document, lacks credibility particularly when historical facts or actual case data exists.

Proposed Alternative BMPs

The following framework for developing site-specific non-water quality CA cost estimates should be considered for inclusion as a possible revision:

- *Landfill Design Requiring No Corrective Action Cost Estimate* – If the landfill feature is designed to a standard above or sufficient to withstand a reasonably foreseeable causal event, then it would be assumed that no damage or a de minimus amount of damage would occur. Consequently, no non-water quality CA cost estimate would be required for that causal event.

- *Reasonably Foreseeable Causal Event Exceeding Class III Landfill Design Standard* – Should the landfill feature not be designed as stated above, then a non-water quality CA would be estimated based on a reasonably foreseeable causal event impacting the landfill that exceeds the existing Title 27 minimum design standard for Class III landfills. A range of what is reasonably foreseeable for that causal event, which allows for the third party expert to determine what specific causal event is appropriate for the landfill given site-specific characteristics and hazards, is suggested as follows:

Precipitation

For rain events or precipitation, a 24-hour storm with a return period (recurrence interval) ranging from 200 to 500 years as the reasonably foreseeable causal event. A third party consultant would determine the specific return period based on site-specific characteristics and hazards. Should the landfill drainage system be designed to accommodate a storm event greater than a 500-year 24-hour storm, then no CA cost estimate would be required.

CalRecycle proposes a 1,000-year 24-hour storm as the BMP perhaps because the Central Valley Regional Water Quality Control Board included the rainfall estimate of such a storm in the waste discharge requirements for a few Class II landfills. Not being Class III landfills, this is not a “like” comparison. A 1,000-year 24-hour storm is an extreme event where there is tremendous uncertainty in estimating the amount of rainfall and should not be considered reasonably foreseeable. Lastly, site-specific characteristics need to be considered in the CA plans because in California, the average annual precipitation varies greatly across the State.

Flood

For floods, a BMP framework where the reasonably foreseeable causal event is commensurate with the FEMA flood risk designation for the landfill area should be considered as a possible revision. For landfills located in an area designed by FEMA as low risk, the causal event would be a 100-year flood. This would not exceed the Class III design standard, so no CA cost estimate would be required. For landfills located in an area designated by FEMA as moderate risk, the causal event would be a flood with a return period ranging from 200 to 500 years. A third-party consultant would determine the specific return period based on site-specific characteristics and hazards. For landfills located in high risk areas, the causal event would be a 500-year flood. If the elevation of the landfill is above the 500-year flood plain, then no CA cost estimate is required. It will be assumed that no damage or a de minimus amount of damage would occur. A 200-year flood is suggested for undesignated FEMA areas.

CalRecycle proposes that a 500-year flood be the causal event. FEMA considers a 500-year flood an “extreme flood,” where in any given year there is a 0.2% of it occurring. This flood event should not be considered reasonably foreseeable. The causal event should instead be commensurate with the level of flood risk.

Fire

For fires, a BMP framework that is commensurate with the fire risk and reflective of real cases of catastrophic fires in California should be considered as a possible revision. As stated above, the fire that impacted the County's Geer Road Landfill damaged only the gas collection piping. The BMP for catastrophic fires should be in line with these kinds of actual data.

CalRecycle's proposed BMP assumes that up to 80 percent of the combustible surface structures within 300 feet of the landfill cell boundaries would be destroyed. This level of destruction likely exceeds real cases of catastrophic fires impacting landfills in California. Furthermore, CalRecycle staff proposes a 20 percent contingency to replace surface structures even if the landfill is not located in any fire hazard zone. This would not appear to be reasonably foreseeable.

Seiche

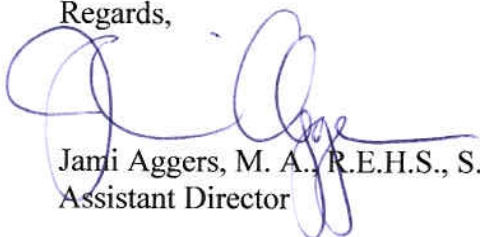
CalRecycle staff proposes that a seiche be a reasonably foreseeable causal event for a landfill that is located within ½ mile of a lake or bay. Please provide historical data which demonstrates that seiches in California have occurred which would make them reasonably foreseeable.

Tsunami

Tsunamis should only be a reasonably foreseeable causal event if the landfill is located in a tsunami inundation zone as designated by the State Department of Conservation or local emergency agency and the topography between the landfill and the coastline is not higher than the predicted wave height.

In summary, thank you again for the opportunity to comment on the *Proposed Best Management Practices for Preparing Site-specific Non-water Quality Corrective Action Plans*. We appreciate your consideration of including a BMP framework where the causal events are both site-specific and reasonably foreseeable, and are commensurate with the risk level for that landfill. Do not hesitate to contact me if you have questions. My direct line telephone number is (209) 525-6768.

Regards,

A handwritten signature in blue ink, appearing to read 'Jami Aggers', is written over the typed name and title.

Jami Aggers, M. A., R.E.H.S., S.C.
Assistant Director

Solid Waste Industry Group

**Sanitation Districts of Los Angeles County
San Bernardino County Department of Public Works Solid Waste Division
Ventura Regional Sanitation District
OC Waste & Recycling
Rural Counties' Environmental Services Joint Powers Authority
Riverside County Waste Management Department
Salinas Valley Solid Waste Authority
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California State Association of Counties
Solid Waste Association of North America, California Chapters
City of Sunnyvale
City of Santa Cruz
Lassen Regional Solid Waste Management Authority
Waste Management
Republic Services
Waste Connections
Recology**

October 15, 2010

Mr. Watson Gin
Project Manager
CalRecycle
1001 I Street
P.O. Box 4025
Sacramento, CA 95812

Dear Mr. Gin:

**CalRecycle's Proposed Best Management Practices (BMPs) for
Preparing Site-Specific Non-Water Quality Corrective Action Plans**

The Solid Waste Industry Group (SWIG) appreciates the opportunity to further comment on CalRecycle's guidance document for preparing site-specific non-water quality corrective action (CA) plans. The purpose of the CA plan is to estimate the cost of any non-water quality CA that may occur in the future as a result of a reasonably foreseeable catastrophic event. The extent of repairs (corrective action) that the landfill operator is to assume depends on the severity of the hypothetical catastrophe. CalRecycle has proposed catastrophes (causal events) so extreme and so improbable that they are not, by any

measure, “reasonably foreseeable.” The financial assurance regulations that were adopted by CalRecycle in 2009 mandate that the CA plans be based on what is “reasonably foreseeable” and site-specific. The signatories to this letter, which collectively represent the vast majority of the solid waste management infrastructure in California, find these causal events (presented in the guidance document as BMPs) unacceptable. We instead propose alternative BMPs for each causal event (summarized in Attachment 1 and discussed below).

Our previous comment letter dated October 4, 2010 focused solely on the seismic portion of the guidance document, proposing an alternative BMP for earthquakes that reflect the current standard of practice for evaluating seismic hazards for most civil and structural engineering design projects in California. This comment letter addresses all the remaining BMPs, which incorrectly assume that what is theoretically possible – no matter how improbable or remote – is reasonably foreseeable.

What is Reasonably Foreseeable?

Reasonably foreseeable is what is likely or can be predicted to occur in the not too distant future with some degree of certainty based on empirical, historical, or scientific evidence. It is not of such low probability that the chances of it occurring at any given moment are extremely remote, becoming speculative in nature. Any of the following criteria can be used to disqualify a causal event from being considered reasonably foreseeable:

- *Extreme Uncertainty in Quantification or Estimate is Questionable* – The event is so improbable and such an outlier that there is very poor accuracy or tremendous uncertainty in quantifying the impact. An example is the 1,000-year 24-hour storm, where in October 2007 the National Oceanic and Atmospheric Administration (NOAA) considered discontinuing the publication of 1,000-year precipitation frequency estimates because of the “severe uncertainty associated with computing such extreme events.”¹
- *Extremely Low Probability of Occurrence* – The severity of certain types of causal events (earthquakes, precipitation, and floods) is determined by the probability of such an event occurring in any given year. As the probability of it occurring approaches zero, however, the causal event is so improbable and so infrequent that it can no longer be considered reasonably foreseeable. It is instead considered an “extreme event” that is extremely unlikely to occur and too speculative to predict. For example, there is a 0.1 % chance of a 1,000-year 24-hour storm occurring in any given year. In other words, there is a 99.9% chance of it not occurring. Such a storm is considered an extreme event, not a reasonably foreseeable event. As another example, the Federal Emergency Management Agency (FEMA) defines an “extreme flood as a 0.2% chance of exceedance (500-year flood).”²

¹ 2008 California Extreme Precipitation Symposium, Presentation on Updating California Precipitation Frequency Estimates by the Chief of Hydrologic Science and Modeling Branch of NOAA

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- *Ignores Fact or Real Cases of Epic Catastrophic Events (in California)* – There are several real cases in which severe fires have impacted landfills. While these fires may have destroyed homes and structures, the damage to the landfill was minimal. Landfills often act as a firebreak given the significant surface area with dirt. For example, the fire that impacted Olinda Alpha Landfill in Orange County primarily damaged the landfill gas collection header pipes around the perimeter of the landfill. While it was one of the largest fires in Orange County’s history, about 20 percent of these landfill structures were lost or damaged. Assuming greater losses, as proposed in the guidance document, lacks credibility in face of historical facts or actual cases. Consequently, hypothetical causal events that are contradictory to fact cannot, by any measure, be considered “reasonably foreseeable.”

Proposed Alternative BMPs

The overall framework that we propose for developing site-specific non-water quality CA cost estimates is summarized in Attachment 1. SWIG proposes two tiers of evaluation for each causal event:

- *Landfill Design Requiring No Corrective Action Cost Estimate* – Should the landfill feature be designed to a standard above or sufficient to withstand a reasonably foreseeable causal event, then it will be assumed that no damage or a de minimus amount of damage would occur. Consequently, no non-water quality CA cost estimate would be required for that causal event.
- *Reasonably Foreseeable Causal Event Exceeding Class III Landfill Design Standard* – Should the landfill feature not be designed as stated above, then a non-water quality CA would be estimated based on a reasonably foreseeable causal event impacting the landfill that exceeds the existing Title 27 minimum design standard for Class III landfills. SWIG proposes a range of what is reasonably foreseeable for that causal event, which allows for the third party expert or consultant to determine what specific causal event is appropriate for the landfill given site-specific characteristics and hazards.

The following are the specific causal events/BMPs that we propose:

Precipitation

For rain events or precipitation, we propose a 24-hour storm with a return period ranging from 200 to 500 years as the reasonably foreseeable causal event. The third party consultant would determine the specific return period based on site-specific characteristics and hazards, some of which may include risk factors from the AB 2296 Study³. Should the landfill drainage system be designed to accommodate a storm event greater than a 500-year 24-hour storm, then no corrective action cost estimate would be required. This BMP framework is presented in the table below.

³ Study to Identify Potential Long-Term Threats and Financial Assurance Mechanisms for Long-Term Postclosure Maintenance and Corrective Action at Solid Waste Landfills, November 2007.

Existing Class III Design Standard	Reasonably Foreseeable Causal Event for which Corrective Action Costs are to be Estimated	Landfill Design Standard in which a Corrective Action Cost Estimate is Not Required
100-Year 24-Hour Storm	200 to 500 year 24-hour storm, depending on the results of a site-specific hazard analysis	Greater than 500-year 24-hour storm

CalRecycle staff proposes a 1,000-year 24-hour storm as the BMP primarily because the Central Valley Regional Water Quality Control Board (Regional Board) included the rainfall estimate of such a storm in the waste discharge requirements (WDRs) for a couple of Class II disposal facilities. These are not Class III municipal solid waste (MSW) landfills. Furthermore, according to a technical paper written by Dana Woodall and Jay Lund of the University of California, Davis, which was published in the Journal of Contemporary Water Research and Education, “the Central Valley level of protection standard is a rain event with a return period ranging from a 200 to 500 years.”⁴

A 1,000-year 24-hour storm is an extreme event where there is tremendous uncertainty in estimating the amount of rainfall. As stated above, in 2007, NOAA considered discontinuing the publication of 1,000-year precipitation frequency estimates because of the “severe uncertainty associated with computing such extreme events.” Consequently, just because a rainfall estimate of such a storm is included in a WDR it does not mean it is accurate or meaningful. A 1,000-year 24-hour storm is not a reasonably foreseeable causal event.

Site-specific characteristics need to be considered in the CA plans. In California, the average annual precipitation varies greatly across the state. Some regions have very arid climates while others are prone to wet weather. In a 2003 CalRecycle report⁵ the contractor (Geosyntec) found that about 75 percent of the 224 landfills surveyed are located in areas with an average annual precipitation of less than 20 inches. Only 8 landfills are located in areas with relatively high precipitation (50 inches per year or greater).

Flood

For floods, we propose a BMP framework where the reasonably foreseeable causal event is commensurate with the FEMA flood risk designation for the area where the landfill is located. For landfills located in an area designed by FEMA as low risk, the causal event would be a 100-year flood. This would not exceed the Class III design standard, so no corrective action cost estimate would be required. For landfills located in an area designated by FEMA as moderate risk, the causal event would be a flood with a return period ranging from 200 to 500 years. The third-party consultant would determine the specific return period based on site-specific characteristics and hazards, some of which may include risk factors from the AB 2296 Study. For landfills located in high flood risk

⁴ *Dutch Flood Policy Innovations for California*, by Dana L. Woodall and Jay R. Lund, published in Journal of Contemporary Waste Research & Education, Issue 141, Pages 45-59, March 2009

⁵ Landfill Facility Compliance Study Phase I Report – Results of Screening Analyses of 224 California MSW Landfills, 2003 CalRecycle Report written by Geosyntec under contract

areas, the causal event is a 500-year flood. If the elevation of the landfill is above the 500-year flood plain, then no corrective action cost estimate is required. It will be assumed that no damage or a de minimus amount of damage would occur. A 200-year flood would be used for undesignated FEMA areas. This BMP framework is presented in the table below.

Existing Class III Design Standard	Reasonably Foreseeable Causal Event for which Corrective Action Costs are to be Estimated	Landfill Design Standard in which a Corrective Action Cost Estimate is Not Required
100-Year Flood	<ul style="list-style-type: none">• 100-year flood for landfills in areas designated by FEMA as low risk, so a de minimus amount of damage is assumed• 200-year flood for landfill in areas undesignated by FEMA• 200 to 500-year flood for landfills in areas designated by FEMA as moderate risk, depending on site-specific hazard analysis• 500-year flood for landfills in areas designated by FEMA as high risk	Elevation of landfill is above the 500-year flood plain

CalRecycle staff proposes that a 500-year flood be the causal event. As indicated above, FEMA considers a 500-year flood an “extreme flood,” where in any given year there is a 0.2% chance of it occurring. This flood event should not be considered reasonably foreseeable. The causal event should instead be commensurate with the level of flood risk.

Our proposed BMP for floods exceeds current design standards. The 100-year storm is typically used for designing flood control protection from major storms and is the current design standard for Class III landfills under Title 27. In an October 7, 2008 presentation to the National Committee on Levee Safety, Dr. Gerry Galloway of the Water Policy Collaborative recommended that a 200-year flood be the standard of flood protection by 2030 in order to provide the “highest level of risk reduction feasible to existing urban areas.”⁶

Fire

For fires, we propose a BMP framework that is commensurate with the fire risk and reflective of real cases of epic catastrophic fires in California. As mentioned above, the fire that impacted Olinda Alpha Landfill in Orange County primarily damaged the landfill gas collection header pipes around the perimeter of the landfill. While it was one of the largest fires in Orange County’s history, only about 20 percent of these surface structures were destroyed or damaged. The BMP for catastrophic fires should be in line with these facts. Additionally, the California Department of Forestry and Fires (Cal Fire) and local

⁶ Background presentation to National Committee on Levee Safety
(http://www.nfrmp.us/ncls/docs/Gerry_Galloway_History_of_Levees.pdf)

agencies have developed hazard maps that show low, moderate, high, or very high fire risk zones. The zones are reflective of the fire risk. The table below presents the BMP framework we propose, which takes into consideration all the above.

Existing Class III Design Standard	Reasonably Foreseeable Causal Event for which Corrective Action Costs are to be Estimated	Landfill Design Standard in which a Corrective Action Cost Estimate is Not Required
Not applicable	<ul style="list-style-type: none"> For landfills in areas designated as moderate risk, it will be assumed that 10% of the combustible surface structures within 100 feet of landfill perimeter⁷ are destroyed For landfills in areas designated as high risk, it will be assumed that 20% of the combustible surface structures within 200 feet of landfill perimeter are destroyed For landfills in areas designated as very high risk, it will be assumed that 30% of the combustible surface structures within 300 feet of landfill perimeter are destroyed 	For landfills in areas designated as low fire risk, no corrective action estimate is required

CalRecycle's proposed BMP assumes that up to 80 percent of the combustible surface structures within 300 feet of the landfill cell boundaries would be destroyed. This level of destruction exceeds real cases of catastrophic fires impacting landfills in California. Furthermore, CalRecycle staff proposes a 20 percent contingency to replace surface structures even if the landfill is not located in any fire hazard zone. This is certainly not reasonably foreseeable.

Seiche

CalRecycle staff proposes that a seiche be a reasonably foreseeable causal event for a landfill that is located within ½ mile of a lake or bay. Given that the only known occurrence of seiche in California was during prehistoric times around Lake Tahoe, seiches are not reasonably foreseeable.

Tsunami

Tsunamis should only be a reasonably causal event if the landfill is located in tsunami inundation zone as designated by the California Department of Conservation or local emergency agency and the topography between the landfill and the coastline is not higher than the predicted wave height. This BMP framework is shown in the table below.

⁷ Permitted facility boundary

Existing Class III Design Standard	Reasonably Foreseeable Causal Event for which Corrective Action Costs are to be Estimated	Landfill Design Standard in which a Corrective Action Cost Estimate is Not Required
Not applicable	If the landfill is located in a tsunami inundation zone as designated by the California Department of Conservation or local emergency agency <u>and</u> the topography between the landfill and the coastline is not higher than the predicted wave height, then a tsunami is a potential causal event.	Landfill is not located in a tsunami inundation zone

Site-Specific Hazard Analysis

The financial assurance regulations that were adopted by CalRecycle allow for site-specific factors, hazards, or characteristics to be considered when developing the non-water quality CA cost estimate. Certain factors, such as immediate proximity to a fault and soils subject to liquefaction, increase the seismic hazard or risk for the landfill. The third party consultant preparing the CA plan should take this into account when selecting the specific return period for the potential earthquake impacting the landfill.

The risk factors contained in the AB 2296 Study, however, should not be the driving criteria for selecting a specific causal event or return period. It was the opinion of many stakeholders at the time that the AB 2296 risk factors were essentially worthless as a risk measurement tool. The risk factors were overly simplistic, unrelated to landfill integrity, not based on any engineering or science, and had no direct connection to a release or probability of CA.⁸

As indicated above, SWIG is proposing a CA estimation framework where the causal events that are used are both site-specific and reasonably foreseeable, and that they are commensurate with the risk level for that landfill. As currently proposed by CalRecycle, this is not the case. Your consideration of our proposed framework and specific BMPs is very much appreciated.

Yours very truly,

Robert Ferrante
 Head, Solid Waste Management Department
 Sanitation Districts of Los Angeles County
 (562) 908-4288, ext. 2403

⁸ See Sanitation Districts of Los Angeles County letter dated November 1, 2007 to Ms. Bobbie Garcia of CalRecycle on Draft Report to Identify Potential Long-Term Threats and Financial Assurance Mechanisms for Long-Term Postclosure Maintenance and Corrective Action at Solid Waste Landfills

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Rachel Oster
Government Relations Manager
Recology
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Cc: Margo Reid-Brown, Director, CalRecycle
Mark Leary, Deputy Director, CalRecycle
Ted Rauh, Assistant Director, CalRecycle
Scott Walker, Chief of Financial Assurances, CalRecycle
Michael Wochnick, Supervisor, CalRecycle

Attachment 1
Causal Event BMPs Proposed by SWIG

Type of Causal Event	Existing Class III Landfill Design Standard	Reasonably Foreseeable Causal Event for which Corrective Action Costs are to be Estimated	Landfill Design Standard in which a Corrective Action Cost Estimate is Not Required
Earthquake	Maximum Probable Earthquake (MPE) In 100 Year Period	For final refuse-fill slope or final cover systems not designed to the MCE, operators would evaluate the potential damage caused by a seismic event with a return period ranging from 200 to 475 years using the probabilistic method. The third party involved in developing the corrective action plan would determine the specific return period after evaluating all site-specific factors, some of which may include risk factors identified in the AB 2296 study.	Maximum Credible Earthquake (MCE): If the landfill's final refuse-fill slope or final cover systems are designed to the MCE, then no corrective action cost estimation or analysis is required.
Precipitation	100-Year 24-Hour Storm	200 to 500 year 24-hour storm, depending on results of a site-specific hazard analysis	Drainage capacity greater than 500-year 24-hour storm
Flood	100-Year Flood	<ul style="list-style-type: none"> • 100-year flood for landfills in areas designated by FEMA as low risk, so a de minimus amount of damage is assumed • 200-year flood for landfill in areas undesignated by FEMA • 200 to 500-year flood for landfills in areas designated by FEMA as moderate risk, depending on site-specific hazard analysis • 500-year flood for landfills in areas designated by FEMA as high risk 	Elevation of landfill is above the 500-year flood plain
Fire	Not applicable	<ul style="list-style-type: none"> • For landfills in areas designated as moderate risk, it will be assumed that 10% of the combustible surface structures within 100 feet of landfill perimeter are destroyed • For landfills in areas designated as high risk, it will be assumed that 20% of the combustible surface structures within 200 feet of landfill perimeter are destroyed • For landfills in areas designated as very high risk, it will be assumed that 30% of the combustible surface structures within 300 feet of landfill perimeter are destroyed 	For landfills in areas designated as low fire risk, no corrective action estimate is required

Tsunami	Not applicable	If the landfill is located in a tsunami inundation zone as designated by the California Department of Conservation or local emergency agency <u>and</u> the topography between the landfill and the coastline is not higher than the predicted wave height, then a tsunami is a potential causal event.	Landfill is not located in a tsunami inundation zone
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Recology**

October 18, 2010

Mr. Watson Gin
Project Manager
CalRecycle
1001 I Street
P.O. Box 4025
Sacramento, CA 95812

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A 1,000-year 24-hour storm is an extreme event where there is tremendous uncertainty in estimating the amount of rainfall. As stated above, in 2007, NOAA considered discontinuing the publication of 1,000-year precipitation frequency estimates because of the “severe uncertainty associated with computing such extreme events.” Consequently, just because a rainfall estimate of such a storm is included in a WDR it does not mean it is accurate or meaningful. A 1,000-year 24-hour storm is not a reasonably foreseeable causal event.

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CalRecycle staff proposes that a 500-year flood be the causal event. As indicated above, FEMA considers a 500-year flood an “extreme flood,” where in any given year there is a 0.2% chance of it occurring. This flood event should not be considered reasonably foreseeable. The causal event should instead be commensurate with the level of flood risk.

Our proposed BMP for floods exceeds current design standards. The 100-year storm is typically used for designing flood control protection from major storms and is the current design standard for Class III landfills under Title 27. In an October 7, 2008 presentation to the National Committee on Levee Safety, Dr. Gerry Galloway of the Water Policy Collaborative recommended that a 200-year flood be the standard of flood protection by 2030 in order to provide the “highest level of risk reduction feasible to existing urban areas.”⁶

Fire

For fires, we propose a BMP framework that is commensurate with the fire risk and reflective of real cases of epic catastrophic fires in California. As mentioned above, the fire that impacted Olinda Alpha Landfill in Orange County primarily damaged the landfill gas collection header pipes around the perimeter of the landfill. While it was one of the largest fires in Orange County’s history, only about 20 percent of these surface structures were destroyed or damaged. The BMP for catastrophic fires should be in line with these facts. Additionally, the California Department of Forestry and Fires (Cal Fire) and local

⁶ Background presentation to National Committee on Levee Safety
 (Hhttp://www.nfrmp.us/ncls/docs/Gerry_Galloway_History_of_Levees.pdfH)

agencies have developed hazard maps that show low, moderate, high, or very high fire risk zones. The zones are reflective of the fire risk. The table below presents the BMP framework we propose, which takes into consideration all the above.

Existing Class III Design Standard	Reasonably Foreseeable Causal Event for which Corrective Action Costs are to be Estimated	Landfill Design Standard in which a Corrective Action Cost Estimate is Not Required
Not applicable	<ul style="list-style-type: none"> For landfills in areas designated as moderate risk, it will be assumed that 10% of the combustible surface structures within 100 feet of landfill perimeter⁷ are destroyed For landfills in areas designated as high risk, it will be assumed that 20% of the combustible surface structures within 200 feet of landfill perimeter are destroyed For landfills in areas designated as very high risk, it will be assumed that 30% of the combustible surface structures within 300 feet of landfill perimeter are destroyed 	For landfills in areas designated as low fire risk, no corrective action estimate is required

CalRecycle's proposed BMP assumes that up to 80 percent of the combustible surface structures within 300 feet of the landfill cell boundaries would be destroyed. This level of destruction exceeds real cases of catastrophic fires impacting landfills in California. Furthermore, CalRecycle staff proposes a 20 percent contingency to replace surface structures even if the landfill is not located in any fire hazard zone. This is certainly not reasonably foreseeable.

Seiche

CalRecycle staff proposes that a seiche be a reasonably foreseeable causal event for a landfill that is located within ½ mile of a lake or bay. Given that the only known occurrence of seiche in California was during prehistoric times around Lake Tahoe, seiches are not reasonably foreseeable.

Tsunami

Tsunamis should only be a reasonably causal event if the landfill is located in tsunami inundation zone as designated by the California Department of Conservation or local emergency agency and the topography between the landfill and the coastline is not higher than the predicted wave height. This BMP framework is shown in the table below.

⁷ Permitted facility boundary

Existing Class III Design Standard	Reasonably Foreseeable Causal Event for which Corrective Action Costs are to be Estimated	Landfill Design Standard in which a Corrective Action Cost Estimate is Not Required
Not applicable	If the landfill is located in a tsunami inundation zone as designated by the California Department of Conservation or local emergency agency <u>and</u> the topography between the landfill and the coastline is not higher than the predicted wave height, then a tsunami is a potential causal event.	Landfill is not located in a tsunami inundation zone

Site-Specific Hazard Analysis

The financial assurance regulations that were adopted by CalRecycle allow for site-specific factors, hazards, or characteristics to be considered when developing the non-water quality CA cost estimate. Certain factors, such as immediate proximity to a fault and soils subject to liquefaction, increase the seismic hazard or risk for the landfill. The third party consultant preparing the CA plan should take this into account when selecting the specific return period for the potential earthquake impacting the landfill.

The risk factors contained in the AB 2296 Study, however, should not be the driving criteria for selecting a specific causal event or return period. It was the opinion of many stakeholders at the time that the AB 2296 risk factors were essentially worthless as a risk measurement tool. The risk factors were overly simplistic, unrelated to landfill integrity, not based on any engineering or science, and had no direct connection to a release or probability of CA.⁸

As indicated above, SWIG is proposing a CA estimation framework where the causal events that are used are both site-specific and reasonably foreseeable, and that they are commensurate with the risk level for that landfill. As currently proposed by CalRecycle, this is not the case. Your consideration of our proposed framework and specific BMPs is very much appreciated.

Yours very truly,

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⁸ See Sanitation Districts of Los Angeles County letter dated November 1, 2007 to Ms. Bobbie Garcia of CalRecycle on Draft Report to Identify Potential Long-Term Threats and Financial Assurance Mechanisms for Long-Term Postclosure Maintenance and Corrective Action at Solid Waste Landfills

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Attachment 1
Causal Event BMPs Proposed by SWIG

Type of Causal Event	Existing Class III Landfill Design Standard	Reasonably Foreseeable Causal Event for which Corrective Action Costs are to be Estimated	Landfill Design Standard in which a Corrective Action Cost Estimate is Not Required
Earthquake	Maximum Probable Earthquake (MPE) In 100 Year Period	For final refuse-fill slope or final cover systems not designed to the MCE, operators would evaluate the potential damage caused by a seismic event with a return period ranging from 200 to 475 years using the probabilistic method. The third party involved in developing the corrective action plan would determine the specific return period after evaluating all site-specific factors, some of which may include risk factors identified in the AB 2296 study.	Maximum Credible Earthquake (MCE): If the landfill's final refuse-fill slope or final cover systems are designed to the MCE, then no corrective action cost estimation or analysis is required.
Precipitation	100-Year 24-Hour Storm	200 to 500 year 24-hour storm, depending on results of a site-specific hazard analysis	Drainage capacity greater than 500-year 24-hour storm
Flood	100-Year Flood	<ul style="list-style-type: none"> 100-year flood for landfills in areas designated by FEMA as low risk, so a de minimus amount of damage is assumed 200-year flood for landfill in areas undesignated by FEMA 200 to 500-year flood for landfills in areas designated by FEMA as moderate risk, depending on site-specific hazard analysis 500-year flood for landfills in areas designated by FEMA as high risk 	Elevation of landfill is above the 500-year flood plain
Fire	Not applicable	<ul style="list-style-type: none"> For landfills in areas designated as moderate risk, it will be assumed that 10% of the combustible surface structures within 100 feet of landfill perimeter are destroyed For landfills in areas designated as high risk, it will be assumed that 20% of the combustible surface structures within 200 feet of landfill perimeter are destroyed For landfills in areas designated as very high risk, it will be assumed that 30% of the combustible surface structures within 300 feet of landfill perimeter are destroyed 	For landfills in areas designated as low fire risk, no corrective action estimate is required

Tsunami	Not applicable	If the landfill is located in a tsunami inundation zone as designated by the California Department of Conservation or local emergency agency <u>and</u> the topography between the landfill and the coastline is not higher than the predicted wave height, then a tsunami is a potential causal event.	Landfill is not located in a tsunami inundation zone
Seiche is not a reasonable foreseeable event			

Solid Waste Industry Group

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Monterey Regional Waste Management District
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October 4, 2010

Mr. Watson Gin
Project Manager
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Dear Mr. Gin:

**Proposal for Best Management Practice (BMP) Covering Seismic
Events in Site-Specific Non-Water Quality Corrective Action Plans**

The Solid Waste Industry Group (SWIG) appreciates the opportunity to participate in the development of the guidance document that will be used by landfill operators in California to prepare non-water quality corrective action plans. These plans will be the basis for landfill operators to provide any additional financial assurance to the state beyond that already provided to the Regional Water Quality Control Boards for known releases to groundwater or reasonably foreseeable water quality corrective action. The draft guidance document outlines

how the non-water quality corrective action cost estimate should be derived. The extent of corrective action (repair) that may be needed is determined by the severity of the catastrophic (causal) event that is assumed to someday impact the landfill. The draft guidance document specifies what causal events should be used to estimate the potential damage that may occur at a landfill and, therefore, the cost of corrective action. Each causal event is described in the form of a BMP. The BMPs contained in CalRecycle's draft guidance document use causal events that we believe are not "reasonably foreseeable" and are, therefore, unacceptable as proposed.

The signatories to this letter, which collectively represent the majority of the solid waste management infrastructure in California, propose an alternative BMP for earthquakes which meets the intent of the financial assurance regulations adopted by CalRecycle in 2009, and incorporates the current standard of practice in geotechnical engineering for evaluating seismic hazards or risks and for structural design. SWIG will send a separate letter proposing alternative BMPs for the other causal events identified in CalRecycle's draft guidance document. *This letter only addresses the seismic BMP.*

Intent of Financial Assurance Regulations

In lieu of providing financial assurance for the complete replacement of the final cover, the regulations allow landfill operators to submit a site-specific non-water quality corrective action plan that evaluates the potential damage that can be caused by a "reasonably foreseeable" causal event that exceeds the landfill's existing design standard. Based on the potential damage, the cost to restore the landfill back to the existing design standard is estimated. Given that each landfill is different, the specific setting, geological profile, and other local characteristics need to be taken into account or considered in the corrective action plans.

Class III Landfill Seismic Design Standard

As described in Title 27, the current minimum seismic design standard for Class III landfills is the maximum probable earthquake (MPE). The MPE is the largest earthquake that is likely to occur during a 100-year time period. The level of ground shaking that is likely to impact the landfill is typically estimated using a deterministic method. The vast majority of Class III landfills in California are designed to the MPE standard.

The premise that seismic events that exceed these well-established design standards are somehow "reasonably foreseeable" is troubling to the solid waste industry in California. Establishing financial assurance for such an extreme event that, by any measure, is so rare and improbable and so far above the established Class III design standards in California strains credibility. While a seismic event may be "theoretically foreseeable" it is not necessarily "reasonably foreseeable."

Methods for Assessing Seismic Hazards

The seismic hazard or risk that a building or structure may have depends on the likely ground motion or shaking that can occur from an earthquake. The greater the ground motion, the

more structural damage can occur. There are two methods used to assess seismic hazards or risks, which, in turn, can be used to estimate the extent of potential structural damage:

- *Deterministic*: This method uses the location and magnitude of the largest known earthquake source closest to the site and estimates the maximum ground shaking (peak ground acceleration) that a site will experience from this particular seismic event. This is an older method that is often used for determining the MPE and always used for estimating the maximum credible earthquake (MCE).
- *Probabilistic*: This method uses the information from all historic earthquakes, plus geologically inferred earthquake sources (faults, locations, and magnitudes) around the site, and computes the peak ground acceleration that a site may experience during a certain return period. This method represents the current standard of practice for evaluating seismic hazards for most civil and structural engineering design projects.

Proposed Seismic BMP

We propose that there be two tiers of evaluation in the corrective action plan for seismic events:

- If the landfill feature, such as the final refuse-fill slope or final cover system, is designed to the MCE, then no corrective action cost estimation or analysis is required. It is certainly not “reasonably foreseeable” that a landfill feature designed to the MCE will have any significant damage from the seismic event.
- For landfill features not designed to the MCE, operators would evaluate the potential damage caused by a seismic event with a return period ranging from 200 to 475 years using the probabilistic method. The earthquakes associated with this range of return period are, in most cases, significantly greater than an MPE. The third party involved in developing the corrective action plan would determine the specific return period after evaluating all site-specific factors, some of which may include risk factors identified in the AB 2296 study¹.

Technical Rationale for Proposed BMP

The intent of the proposed BMP is to use the current standard of practice for evaluating seismic hazards to determine a site-specific and reasonable foreseeable seismic event that is appropriate for landfills and relevant to estimating corrective action costs.

Seismic Hazard Classification of Landfills

At CalRecycle’s seismic workshop on August 30, 2010, the current standard of practice for designing various types of facilities and evaluating seismic hazards was presented. When determining the relative hazard that a facility or structure bears, the standard practice is to consider the consequence of structural failure or damage, such as:

¹ Study to Identify Potential Long-Term Threats and Financial Assurance Mechanisms for Long-Term Postclosure Maintenance and Corrective Action at Solid Waste Landfills, November 2007.

SWIG Proposal for the Seismic BMP

- Loss of human life
- Disruption of essential services, such as medical and other lifeline facilities
- Property losses
- Environmental impacts

Using these criteria, earthquakes represent a high risk or hazard to dams, levees, hospitals, schools, and nuclear power plants given the potential loss of life that could occur as a consequence of structural failure. Class III landfills, which are not built for human occupancy, are considered a relatively low hazard since there would generally be no potential for loss of life, no likely disruption of essential services, and typically minimal to no property losses. The environmental impacts would be limited for several reasons: monolithic final covers can be quickly repaired by adding dirt, landfill gas collection systems can be restored in a relatively short amount of time, and structures on the landfill, for the most part, are not critical to the day-to-day operation of the landfill and would have minimal impact on the environment. Many landfills also have impervious barriers underground to prevent any contaminated groundwater from migrating offsite. Additionally, leachate generation and landfill gas production rates typically decline rapidly after landfill closure, lessening the risk over time.

Seismic Standards Used Today

The following are examples of seismic standards used to design facilities, all of which have a higher hazard risk level than Class III landfills:

- The United States Army Corps of Engineers, which oversees a wide range of facilities (mostly water-bearing) ranging from minimal to extremely high seismic hazards, uses the probabilistic method and a 144-year return period as their operating basis earthquake.
- As part of the Urban Levee Geotechnical Evaluations Program, the California Department of Water Resources (DWR) uses the probabilistic method and ground motions associated with a 200-year return period to evaluate the seismic stability of critical levees in the Sacramento-San Joaquin Valley and to identify areas in need of repair. This is also used by DWR to develop mitigation measures and corrective action cost estimates.
- In simple terms, the California Building Code (CBC) essentially requires that ground motions associated with a 475-year return period be used for designing buildings for human occupancy.
- The Office of Statewide Health Planning and Development has historically required hospitals to use ground motions associated with 475-year return period as a seismic design requirement for maintaining the building operational after an earthquake.

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SWIG Proposal for the Seismic BMP

Based on the body of current engineering practices, a probabilistically derived earthquake with a return period ranging from 200 to 475 years is the appropriate standard for estimating reasonably foreseeable corrective action costs for landfills.

Your consideration of our proposed seismic BMP is very much appreciated.

Yours very truly,

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October 7, 2010

Mr. Watson Gin
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Dear Mr. Gin:

CalRecycle's Proposed Best Management Practices (BMPs) for Preparing Site-Specific Non-Water Quality Corrective Action Plans

The Solid Waste Industry Group (SWIG) appreciates the opportunity to further comment on CalRecycle's guidance document for preparing site-specific non-water quality corrective action (CA) plans. The purpose of the CA plan is to estimate the cost of any non-water quality CA that may occur in the future as a result of a reasonably foreseeable catastrophic event. The extent of repairs (corrective action) that the landfill operator is to assume depends on severity of the hypothetical catastrophe. CalRecycle has proposed catastrophes (causal events) so extreme and so improbable that they are not, by any

measure, “reasonably foreseeable.” The financial assurance regulations that were adopted by CalRecycle in 2009 mandate that the CA plans be based on what is “reasonably foreseeable” and site-specific. The signatories to this letter, which collectively represent the vast majority of the solid waste management infrastructure in California, find these causal events (presented in the guidance document as BMPs) unacceptable. We instead propose alternative BMPs for each causal event (summarized in Attachment 1 and discussed below).

Our previous comment letter dated October 4, 2010 focused solely on the seismic portion of the guidance document, proposing an alternative BMP for earthquakes that reflect the current standard of practice for evaluating seismic hazards for most civil and structural engineering design projects in California. This comment letter addresses all the remaining BMPs, which incorrectly assume what is theoretically possible – no matter how improbable or remote – is reasonably foreseeable.

What is Reasonably Foreseeable?

Reasonably foreseeable is what is likely or can be predicted to occur in the not too distant future with some degree of certainty based on empirical, historical, or scientific evidence. It is not of such low probability that the chances of occurring at any given moment are extremely remote, becoming speculative in nature. Any of the following criteria can be used to disqualify a causal event from being considered reasonably foreseeable:

- *Extreme Uncertainty in Quantification or Estimate is Questionable* – The event is so improbable and such an outlier that there is very poor accuracy or tremendous uncertainty in quantifying the impact. An example is the 1,000-year 24-hour storm, where in October 2007 the National Oceanic and Atmospheric Administration (NOAA) considered discontinuing the publication of 1,000-year precipitation frequency estimates because of the “severe uncertainty associated with computing such extreme events.”¹
- *Extremely Low Probability of Occurrence* – The severity of certain types of causal events (earthquakes, precipitation, and floods) is determined by the probability of such an event occurring in any given year. As the probability of it occurring approaches zero, however, the causal event is so improbable and so infrequent that it can no longer be considered reasonably foreseeable. It is instead considered an “extreme event” that is extremely unlikely to occur and too speculative to predict. For example, there is a 0.1 % chance of a 1,000-year 24-hour storm occurring in any given year. In other words, there is a 99.9% chance of it not occurring. Such a storm is considered an extreme event, not a reasonably foreseeable event. As another example, the Federal Emergency Management Agency (FEMA) defines an “extreme flood as a 0.2% chance of exceedance (500-year flood).”²

¹ 2008 California Extreme Precipitation Symposium, Presentation on Updating California Precipitation Frequency Estimates by the Chief of Hydrologic Science and Modeling Branch of NOAA

² 2007 California Extreme Precipitation Symposium, Presentation on Extreme Flood Concepts, An Historical Perspective, by a Senior Advisor for Institute for Water Resources, U.S. Army Corps of Engineers

SWIG Proposal for Causal Event BMPs

- *Ignores Fact or Real Cases of Epic Catastrophic Events (in California)* – There are several real cases in which severe fires have impacted landfills. While these fires may have destroyed homes and structures, the damage to the landfill was minimal. Landfills often act as a firebreak given the significant surface area with dirt. For example, the fire that impacted Olinda Alpha Landfill in Orange County primarily damaged the landfill gas collection header pipes around the perimeter of the landfill. While it was one of the largest fires in Orange County’s history, about 20 percent of these landfill structures were lost or damaged. Assuming greater losses, as proposed in the guidance document, lacks credibility in face of historical facts or actual cases. Consequently, hypothetical causal events that are contradictory to fact cannot, by any measure, be considered “reasonably foreseeable.”

Proposed Alternative BMPs

The overall framework that we propose for developing site-specific non-water quality CA cost estimates is summarized in Attachment 1. SWIG proposes two tiers of evaluation for each causal event:

- *Landfill Design Requiring No Corrective Action Cost Estimate* – Should the landfill feature be designed to a standard above or sufficient to withstand a reasonably foreseeable causal event, then it will be assumed that no damage or a de minimus amount of damage would occur. Consequently, no non-water quality CA cost estimate would be required for that causal event.
- *Reasonably Foreseeable Causal Event Exceeding Class III Landfill Design Standard* – Should the landfill feature not be designed as stated above, then a non-water quality CA would be estimated based on a reasonably foreseeable causal event impacting the landfill that exceeds the existing Title 27 minimum design standard for Class III landfills. SWIG proposes a range of what is reasonably foreseeable for that causal event, which allows for the third party expert or consultant to determine what specific causal event is appropriate for the landfill given site-specific characteristics and hazards.

The following are the specific causal events or BMPs that we propose:

Precipitation

For rain events or precipitation, we propose a 24-hour storm with a return period ranging from 200 to 500 years as the reasonably foreseeable causal event. The third party consultant would determine the specific return period based on site-specific characteristics and hazards, some of which may include risk factors from the AB 2296 Study³. Should the landfill drainage system be designed to accommodate a storm event greater than a 500-year 24-hour storm, then no corrective action cost estimate would be required. This BMP framework is presented in the table below.

³ Study to Identify Potential Long-Term Threats and Financial Assurance Mechanisms for Long-Term Postclosure Maintenance and Corrective Action at Solid Waste Landfills, November 2007.

SWIG Proposal for Causal Event BMPs

Existing Class III Design Standard	Reasonably Foreseeable Causal Event for which Corrective Action Costs are to be Estimated	Landfill Design Standard in which a Corrective Action Cost Estimate is Not Required
100-Year 24-Hour Storm	200 to 500 year 24-hour storm, depending on the results of a site-specific hazard analysis	Greater than 500-year 24-hour storm

CalRecycle staff proposes a 1,000-year 24-hour storm as the BMP primarily because the Central Valley Regional Water Quality Control Board (Regional Board) included the rainfall estimate of such a storm in the waste discharge requirements (WDRs) for a couple of Class II disposal facilities. These are not Class III municipal solid waste (MSW) landfills. Furthermore, according to a technical paper written by Dana Woodall and Jay Lund of the University of California, Davis, which was published in the Journal of Contemporary Water Research and Education, “the Central Valley level of protection standard is a rain event with a return period ranging from a 200 to 500 years.”⁴

A 1,000-year 24-hour storm is an extreme event where there is tremendous uncertainty in estimating the amount of rainfall. As stated above, in 2007, NOAA considered discontinuing the publication of 1,000-year precipitation frequency estimates because of the “severe uncertainty associated with computing such extreme events.” Consequently, just because a rainfall estimate of such a storm is included in a WDR it does not mean it is accurate or meaningful. A 1,000-year 24-hour storm is not a reasonably foreseeable causal event.

Site-specific characteristics need to be considered in the CA plans. In California, the average annual precipitation varies greatly across the state. Some regions have very arid climates while others are prone to wet weather. In a 2003 CalRecycle report⁵ the contractor (Geosyntec) found that about 75 percent of the 224 landfills surveyed are located in areas with an average annual precipitation of less than 20 inches. Only 8 landfills are located in areas with relatively high precipitation (50 inches per year or greater).

Flood

For floods, we propose a BMP framework where the reasonably foreseeable causal event is commensurate with the FEMA flood risk designation for the area where the landfill is located. For landfills located in an area designed by FEMA as low risk, the causal event would be a 100-year flood. This would not exceed the Class III design standard, so no corrective action cost estimate would be required. For landfills located in an area designated by FEMA as moderate risk, the causal event would be a flood with a return period ranging from 200 to 500 years. The third-party consultant would determine the specific return period based on site-specific characteristics and hazards, some of which may include risk factors from the AB 2296 Study. For landfills located in high flood risk

⁴ *Dutch Flood Policy Innovations for California*, by Dana L. Woodall and Jay R. Lund, published in Journal of Contemporary Waste Research & Education, Issue 141, Pages 45-59, March 2009

⁵ Landfill Facility Compliance Study Phase I Report – Results of Screening Analyses of 224 California MSW Landfills, 2003 CalRecycle Report written by Geosyntec under contract

SWIG Proposal for Causal Event BMPs

areas, the causal event is a 500-year flood. If the elevation of the landfill is above the 500-year flood plain, then no corrective action cost estimate is required. It will be assumed that no damage or a de minimus amount of damage would occur. A 200-year flood would be used for undesignated FEMA areas. This BMP framework is presented in the table below.

Existing Class III Design Standard	Reasonably Foreseeable Causal Event for which Corrective Action Costs are to be Estimated	Landfill Design Standard in which a Corrective Action Cost Estimate is Not Required
100-Year Flood	<ul style="list-style-type: none"> 100-year flood for landfills in areas designated by FEMA as low risk, so a de minimus amount of damage is assumed 200-year flood for landfill in areas undesignated by FEMA 200 to 500-year flood for landfills in areas designated by FEMA as moderate risk, depending on site-specific hazard analysis 500-year flood for landfills in areas designated by FEMA as high risk 	Elevation of landfill is above the 500-year flood plain

CalRecycle staff proposes that a 500-year flood be the causal event. As indicated above, FEMA considers a 500-year flood an “extreme flood,” where in any given year there is a 0.2% of occurring. This flood event should not be considered reasonably foreseeable. The causal event should instead be commensurate with the level of flood risk.

Our proposed BMP for floods exceeds current design standards. The 100-year storm is typically used for designing flood control protection from major storms and is the current design standard for Class III landfills under Title 27. In an October 7, 2008 presentation to the National Committee on Levee Safety, Dr. Gerry Galloway of the Water Policy Collaborative recommended that a 200-year flood be the standard of flood protection by 2030 in order to provide the “highest level of risk reduction feasible to existing urban areas.”⁶

Fire

For fires, we propose a BMP framework that is commensurate with the fire risk and reflective of real cases of epic catastrophic fires in California. As mentioned above, the fire that impacted Olinda Alpha Landfill in Orange County primarily damaged the landfill gas collection header pipes around the perimeter of the landfill. While it was one of the largest fires in Orange County’s history, only about 20 percent of these surface structures were destroyed or damaged. The BMP for catastrophic fires should be in line with these facts. Additionally, the California Department of Forestry and Fires (Cal Fire) and local

⁶ Background presentation to National Committee on Levee Safety
http://www.nfrmp.us/ncls/docs/Gerry_Galloway_History_of_Levees.pdf

SWIG Proposal for Causal Event BMPs

agencies have developed hazard maps that show low, moderate, high, or very high fire risk zones. The zones are reflective of the fire risk. The table below presents the BMP framework we propose, which takes into consideration all the above.

Existing Class III Design Standard	Reasonably Foreseeable Causal Event for which Corrective Action Costs are to be Estimated	Landfill Design Standard in which a Corrective Action Cost Estimate is Not Required
Not applicable	<ul style="list-style-type: none"> For landfills in areas designated as moderate risk, it will be assumed that 10% of the combustible surface structures within 100 feet of landfill perimeter⁷ are destroyed For landfills in areas designated as high risk, it will be assumed that 20% of the combustible surface structures within 200 feet of landfill perimeter are destroyed For landfills in areas designated as very high risk, it will be assumed that 30% of the combustible surface structures within 300 feet of landfill perimeter are destroyed 	For landfills in areas designated as low fire risk, no corrective action estimate is required

CalRecycle's proposed BMP assumes that up to 80 percent of the combustible surface structures within 300 feet of the landfill cell boundaries would be destroyed. This level of destruction exceeds real cases of catastrophic fires impacting landfills in California. Furthermore, CalRecycle staff proposes a 20 percent contingency to replace surface structures even if the landfill is not located in any fire hazard zone. This is certainly not reasonably foreseeable.

Seiche

CalRecycle staff proposes that a seiche be a reasonably foreseeable causal event for a landfill that is located within ½ mile of a lake or bay. Given that the only known occurrence of seiche in California was during prehistoric times around Lake Tahoe, seiches are not reasonably foreseeable.

Tsunami

Tsunamis should only be a reasonably causal event if the landfill is located in tsunami inundation zone as designated by the California Department of Conservation or local emergency agency and the topography between the landfill and the coastline is not higher than the predicted wave height. This BMP framework is shown in the table below.

⁷ Permitted facility boundary

Existing Class III Design Standard	Reasonably Foreseeable Causal Event for which Corrective Action Costs are to be Estimated	Landfill Design Standard in which a Corrective Action Cost Estimate is Not Required
Not applicable	If the landfill is located in a tsunami inundation zone as designated by the California Department of Conservation or local emergency agency <u>and</u> the topography between the landfill and the coastline is not higher than the predicted wave height, then a tsunami is a potential causal event.	Landfill is not located in a tsunami inundation zone

Site-Specific Hazard Analysis

The financial assurance regulations that were adopted by CalRecycle allow for site-specific factors, hazards, or characteristics to be considered when developing the non-water quality CA cost estimate. Certain factors, such as immediate proximity to a fault and soils subject to liquefaction, increase the seismic hazard or risk for the landfill. The third party consultant preparing the CA plan should take this into account when selecting the specific return period for the potential earthquake impacting the landfill.

The risk factors contained in the AB 2296 Study, however, should not be the driving criteria for selecting a specific causal event or return period. It was the opinion of many stakeholders at the time that the AB 2296 risk factors were essentially worthless as a risk measurement tool. The risk factors were overly simplistic, unrelated to landfill integrity, not based on any engineering or science, and had no direct connection to a release or probability of CA.⁸

As indicated above, SWIG is proposing a CA estimation framework where the causal events that are used are both site-specific and reasonably foreseeable, and that they are commensurate with the risk level for that landfill. As currently proposed by CalRecycle, this is not the case. Your consideration of our proposed framework and specific BMPs is very much appreciated.

Yours very truly,

Robert Ferrante
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Sanitation Districts of Los Angeles County
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⁸ See Sanitation Districts of Los Angeles County letter dated November 1, 2007 to Ms. Bobbie Garcia of CalRecycle on Draft Report to Identify Potential Long-Term Threats and Financial Assurance Mechanisms for Long-Term Postclosure Maintenance and Corrective Action at Solid Waste Landfills

Cc: Margo Reid-Brown, Director, CalRecycle
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Ted Rauh, Assistant Director, CalRecycle
Scott Walker, Chief of Financial Assurances, CalRecycle
Michael Wochnick, Supervisor, CalRecycle

Attachment 1
Causal Event BMPs Proposed by SWIG

Type of Causal Event	Existing Class III Landfill Design Standard	Reasonably Foreseeable Causal Event for which Corrective Action Costs are to be Estimated	Landfill Design Standard in which a Corrective Action Cost Estimate is Not Required
Earthquake	Maximum Probable Earthquake (MPE) In 100 Year Period	For final refuse-fill slope or final cover systems not designed to the MCE, operators would evaluate the potential damage caused by a seismic event with a return period ranging from 200 to 475 years using the probabilistic method. The third party involved in developing the corrective action plan would determine the specific return period after evaluating all site-specific factors, some of which may include risk factors identified in the AB 2296 study.	Maximum Credible Earthquake (MCE): If the landfill's final refuse-fill slope or final cover systems are designed to the MCE, then no corrective action cost estimation or analysis is required.
Precipitation	100-Year 24-Hour Storm	200 to 500 year 24-hour storm, depending on results of a site-specific hazard analysis	Drainage capacity greater than 500-year 24-hour storm
Flood	100-Year Flood	<ul style="list-style-type: none"> 100-year flood for landfills in areas designated by FEMA as low risk, so a de minimus amount of damage is assumed 200-year flood for landfill in areas undesignated by FEMA 200 to 500-year flood for landfills in areas designated by FEMA as moderate risk, depending on site-specific hazard analysis 500-year flood for landfills in areas designated by FEMA as high risk 	Elevation of landfill is above the 500-year flood plain
Fire	Not applicable	<ul style="list-style-type: none"> For landfills in areas designated as moderate risk, it will be assumed that 10% of the combustible surface structures within 100 feet of landfill perimeter are destroyed For landfills in areas designated as high risk, it will be assumed that 20% of the combustible surface structures within 200 feet of landfill perimeter are destroyed For landfills in areas designated as very high risk, it will be assumed that 30% of the combustible surface structures within 300 feet of landfill perimeter are destroyed 	For landfills in areas designated as low fire risk, no corrective action estimate is required

Tsunami	Not applicable	If the landfill is located in a tsunami inundation zone as designated by the California Department of Conservation or local emergency agency <u>and</u> the topography between the landfill and the coastline is not higher than the predicted wave height, then a tsunami is a potential causal event.	Landfill is not located in a tsunami inundation zone
Seiche is not a reasonable foreseeable event			